Minutes of Meeting LOFAR Software

Date:	2008-08-13
Next meeting:	2008-08-20 9:15-10:15
	Multimedia room
Present:	
Andre Gunst	No
Ronald Nijboer	Yes
Ruud Overeem	Yes
John Romein	Yes
Michael Wise	Yes

cc: Arnold Meijster, Rob van Nieuwpoort, Arthur Coolen, Jurjen Sluman, Pieter Donker, Chris Broekema, Martin Gels, Joris v. Zwieten, Marcel Loose, Adriaan Renting, Ger van Diepen, Max Avruch, Michiel v. Haarlem, Jan Reitsma, Ger de Bruyn, Arno Schoenmaker, Hanno Holties, Corina Vogt, Jan Noordam, Joe Masters, Lars Bähren, Dion Kant, Johan Hamaker, Maaijke Mevius

Remarks previous minutes

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Announcements

- Ronald will be on holiday for three weeks. Marcel will chair the offline meeting in his absence and sit in on the coordination meeting.
- The 2nd MSSS meeting will be held on Thursday (Aug 21) in Dwingeloo.

Action item overview

ID	Date submitted	Description	Owner	Planned date	Status
66	20080723	Make "Towards 20 Stations" development plan. Done.	Andre	20080730	Closed
67	20080723	Should the station beamformer data reader written by Joe also support 4 bit and 8 bit data? Yes, it is in the LOFAR20 plan.	Michael	20080730	Closed
68		Test whether TBB dumps are actually possible from the station hardware (not just the test hardware).	Michael	20080822	Open
69	20080813	Draft set of regression tests for CIMAGER (with input from Casey)		20080829	Open

Last: 69

Progress

Stations (André):

Achieved since last meeting:

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Problems / current activities:

- Dips: Michiel Brentjens can currently predict the dips and the cause appears to be in the BeamServer software. The problem has not been solved yet.
- Long distance delay tracking observations have been done. James Anderson will look for fringes.

Next actions:

- Start with LOFAR20

OLAP (John):

Achieved since last meeting:

- John has improved the online bandpass correction. A ½ channel shift results in a much better correction. Some edge effects are still apparent. The remaining residual gradient needs to be understood, but could be due to the global bandpass.
- John has produced a draft document describing the online bandpass correction.
- John has been cleaning up some of the residual CEP frame code.
- Martin is away for 2 ½ weeks holiday.
- Chris is in the US for the USRI and then a visit to IBM.

Problems / current activities:

- Taking raw data does not work yet.
- A number of apparently random crashes have been occurring during data writing. The cause is still not currently known. Arnold will be working on making the data writing more robust.
- Rob is busy implementing the TAB mode, especially for the superstation. The issue of how to best handle data drop-outs is still being explored.
- Robustness for failing disks is not included yet (Arnold Meijsters).

Next actions:

- Start with LOFAR20

Offline pipeline (Ronald):

Achieved since last meeting:

- Work is under way to compile the Imager and DP^3 on the 64 bit machines.
- Marcel is looking into stringing these two together as a pipeline.
- A new version of the CIMAGER is available which seems to fix the coordinate flips and negative depressions seen around bright sources.
- Maaijke is still working on the SPAM framework in BBS.

- Ronald has finished a revised draft of the MSSS specification and it has been distributed to all potential MSSS meeting attendees. It is available on the LOFAR Wiki for those interested.
- Pandey is at the URSI.
- Apparently he ASKAP project is considering using a BG/P as a correlator and is interested in collaboration.

Problems / current activities:

- The CIMAGER needs a set of regression tests which include scientific validation (fluxes, positions, etc.) as well as standard development unit/build tests.
- Marcel is busy porting the offline software to 64 bit machines.
- Pandey will commission the Global Solver.
- Treatment of parameters in BBS and mapping of parameters to grid needs to speed up.
- Pandey will test the HBA dipole beam model in BBS.
- The new flagging algorithm of Pandey needs to be tested.

Next actions:

- Start with LOFAR20

SAS + MAC + SHM (Ruud):

Achieved since last meeting:

- Ruud has been working on the test scripts for the stations.
- Everyone else is on holiday.

Problems / current activities:

- Issue: 7 seconds per subband. Optimization is already made. Three seconds can be gained with this.
- The information of the MCU should be connected to the database too.
- As it stands now: real significant different observations on BG/P has as a consequence that the RSP Driver must be restarted with another configuration file. This is the case if the station data must be send to different IOs of the BG/P from observation to observation.
- Metadata flow work is ongoing. Arno is busy with a mechanism to distribute the static meta data from SAS to the stations. It would be great if that can be finished as well in Step 5.
- Extra status registers which are implemented in the FPGAs are not driven yet by the LCU.

- The RCU is currently able to drive the power supply of the HBA independent of the modem (which is desirable from an EMC perspective). The remainder left is that the LCU can also drive this bit.

Next actions:
- Start with LOFAR20

User Software (Michael):

Achieved since last meeting:
- Joe is still working on documentation for the DAL library and data writers.
- Joe has updated drafts for the TBB and Beam-formed data ICDs.
- Joe has also been fixing a few small bugs that the Archive team in Groningen have found.
- Lars is continuing to work on the near-field imager.
- Lars patched a few small issues with the CMAKE build system to improve support for building the CR tools on multiple platforms.
- John Swinbank is working on a proof-of-concept test to demonstrate using iPython to spawn and control parallel pipelines.

Problems / current activities:

- Casey will design a set of scientific validation tests for the CIMAGER.
- Near field imager work is ongoing.
- Lars is also continuing to support Martin's efforts with CMAKE.
- Members of the Magnetism KSP are exploring using the VisIVO package to visualize RM synthesis cubes.
- Alexander started with a radio image mosaicing script for casacore.

Next actions:
- Start with LOFAR20

Holidays

John: From ~26 August 3 weeks and structural one day off from ~26 August onwards.
Ronald: 25 August to 12 September

Software integration

Achieved since last meeting:
- Martin, Marcel and Lars are busy to compile LOFAR code with cmake. Some issues are not solved yet. The compile times have been significantly improved. No reconfiguration done: 9 times as fast. Reconfiguration necessary then 16 times as

fast. There is no integration with the SVN server yet. We need a recommendation /assessment on how to proceed from Martin, Lars, Marcel and Ger.

Problems / current activities:

- A request of Michiel Brentjes was to keep a clean trunk. John suggests to tag the production release.
- Compile a list of anticipated data products and calibration or metadata files associated with each of the pipelines.
- LOFAR development software needs to be build in Kubuntu (Michael has volunteered)

Next actions:

- Define the length of Step 4.
- Step 2+: A test program will be initiated to verify the functioning of the LOFAR software in a more structured way. In OLAP it is possible to store the raw station data and feed this into the pipeline later on. This makes it possible to define a standard data set, which can be applied to the pipeline as soon as major software changes have been taken place.

Scaling up work for 20 stations

After Step 5, one full week will be used to update the documentation of the software.

Current list of tasks to do and when (**now ordered by step**):

Stations:

- Definition of test suite to be run by the LCU. Step 1.
- ARP in the TBB. Step 1.
- Conversion to ITRF coordinates. Step 1.
- Change that RSP boards only send data if the LCU says so each e.g. 10 seconds. Step 1.
- For the stations the split HBA field boards must be produced and tested in the field. Step 2.
- The firmware for the HBA field split must be written. Step 2.
- Additions in the LCU software for the HBA field split are required. Step 2.
- One central clock should be implemented in the super station. Step 2.
- Bit for beam exchange mode in firmware, LCU. Step 3.
- Station HBA calibration. Functional: Step 2. Operational: Step 3. Optimized: Step 3+.

OLAP:

- Conversion to ITRF coordinates. Step 1.
- Script on central machine to check station broadcasts (Chris). Step 1.
- Making the storage section fault-tolerant and more efficient by using multiple compute cores. Step 1.

- Tied-array beamforming implementation for super station. Step 1.
- Snapshot imaging support (changing beams in time). Step 2.
- Possibly optimizations in the IO nodes to cope with four RSP data streams on one BG/P IO node. Step 2.
- Multiple TABs: Step 3+
- Multiple observations or one observation with multiple beams which change as a function of time. Step 3+

Offline:

- Conversion to ITRF coordinates. Step 1.
- DP^3 online bandpass correction. Remainder of Step 5 (on hold). Step 1.
- DP^3 offline clock phase correction definition. Step 1.
- BBS global solver testing and commissioning. Step 1.
- BBS implementation of solution based flagging. Step 1.
- BBS parameter handling. Step 1.
- BBS ionospheric SPAM implementation. Step 1.
- Integration of DP^3 and CImager. Step 1.
- Update of parameter database. Step 1.
- Commissioning of CImager. Step 1.
- Script for parallel imager. Step 1.
- Image N channels into M channels instead of 1 channel. Step 1.
- Profiling of CImager. Step 1.
- BBS beam model testing. Step 1.
- DP^3 offline clock phase correction implementation. Step 2.
- BBS ionospheric SPAM test. Step 2.
- BBS station beam testing. Step 2.
- Imaging for full stokes parameters. Step 2.
- Integration of DP^3 , BBS and CImager. Step 2.
- DP^3 global bandpass correction. Step 3.
- Facet corrected imaging. Step 3.
- Integration of DP^3 , BBS, CImager and source finding. Step 3.
- Weighting schemes. Step 3+.
- Integration with MAC/SAS. Step 3+.
- GSM/LSM: ?
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SAS/MAC:

- Station LBA calibration optimization. Step 1.
- Updating to Navigator 2.0 to enhanced functionalities in Step 1.
- Station test scripts for station acceptance. Step 1.
- Proof reaction times and trigger performance measurements. Step 1.
- MAC uses feedback from SHM. Step 1.
- Conversion to ITRF coordinates (BeamServer modifications). Step 1.
- Coordinates centrally available. Step 1.
- Temperature control. Step 1.
- LCU trigger code integrated and connected to MAC/SAS. Step 1.

- TBB dumps under control of MAC/SAS. Step 2.
- TBB data writer under control of MAC/SAS. Step 2.
- Making screens for the 20 station configuration. Step 2.
- MAC/SAS screens for known pulsar mode. Step 2.
- Ring splitter control. Step 2.
- Write TBB metadata to database. Step 2.
- Write BF data to database. Step 2.
- BF data writer under control of MAC/SAS. Step 2, 3.
- Switch MAC addresses flexible. Step 2, 3.
- Hardware monitor and software monitor for central machines. For BG/P it is necessary to check if it is still up. Step 2, 3.
- Control to enable switching between 4 bit, 8 bit or 16 bit station data. Step 3.
- Reconfigure international switches for stand alone mode (starting SNMP script). Step 3.
- Scheduler. Step 3++.
- Wish list: horizon vector in the stations, beamtracking suitable for the solar system. Step 3++.
- Station calibration and trigger information metadata available. Step 3+.
- Control of off-line processing. Step 3++.

USG:

- TBB data writer capable of accessing databases to retrieve metadata. Step 1.
- CR tools ready to read and process TBB HDF5 files. Step 1.
- Skymapper ready to make images from TBB HDF5 files. Step 1.
- Version of beamformed data writer which can accept BF data stream either from BG/P or from stations directly. Step 1.
- BF data writer capable of accessing databases to retrieve metadata information. Step 1.
- Native support in DAL for PRESTO/SIGPROC formats. Step 1.
- Updates to PRESTO to use DAL HDF5 BF data natively. Step 1.
- Data product content definition document. Step 1.
- Pipeline framework definition. Step 1.
- Implement dedisperse, period fold and pulse search algorithms in offline pipeline. Step 2.
- GSM/LSM implementation. Step 2.
- Data product definition implementation. Step 2.
- Lightweight mosaicing tool. Step 2.
- DAL update to support 4 bit and 8 bit mode. Step 3.
- Source finding: ?
- Commissioning tasks: ?
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Decisions

ID	Date	Decision

	submitted	
02	20061220	Every Step will start with a Kick-off meeting, in which the complete software team participates.
~~03~~	~~20061220~~	~~The project team starts immediately with the preparations of the next CDR in order to preserve progress of the CS1 realization~~
04	20070116	This meeting will take place every week on Tuesday 11:00. The existing software team meeting with all developers will stop to exist.
05	20070130	Step 1 will be changed to 16 subbands instead of 32 subbands.
06	20070130	Step 2 will contain a multiple node BBS. 6 µStations/Station will be postponed. Instead of this, 32 subbands measurements will be realized.
07	20070206	Step 1 will support 160 MHz observations. The other steps will support 200 MHz as well.
08	20070424	Step 2 will support 16 subbands @ 200MHz and 24 MHz at 160 MHz
09	20070424	During the rest of step two, OLAP will only support observations during the weekend.
10	20070522	The number of subbands per Measurement Set is set to 6 or 8 default.
11	20070522	Scheduler activities will be preferably activated in Q4 2007.
12	20070522	Procure, three Local Control Units to accommodate 12 microstations in CS010 in a quick way.
13	20070529	Integrate version numbers in all software.
14	20070529	Distinguish the software between a production version and an engineering version (partly now already the case).
15	20070605	All developed software under CVS will be transferred to Subversion. The main reason for this is that Subversion supports the integration of version numbers in the executables. In this way you can always retrieve which software is used for a certain build. First the impact of the transfer will be investigated by Marcel.
16	20070619	Marcel Loose will be the librarian of the LOFAR software. The available time for this will be shared with his BBS work.
17	20070710	The known pulsar survey mode will be the next mode to support (not in its full extent but partly on-line and off-line).
18	20070710	The temporarily off-line part of the known pulsar mode pipeline will not be under control of SAS/MAC. This will be put under control of SAS/MAC as soon as that software is available in the on-line part of the system.
19	20070814	Joe Masters makes the routine to read in the TBB data.
20	20071002	Fault tolerance of the system (mainly OLAP) is put at the top of the priority list after closing the SAS-MAC and CEP integration.
21	20071123	Kubuntu 7.10 desktop 64 bit OS is chosen for all machines except the BG/L and MAC/SAS machines
22	20071123	Station calibration work is smeared out over Step 4 and Step 5.
23	20071123	Global bandpass shape is moved to Step 5 because of its low priority.
24	20071211	Multiple beams per observation will be implemented instead of multiple observations (this is consistent with the plan).
25	20071211	Step 3 will be closed next Thursday. Any open items will be finished in Step 4.
26	20080130	Multiple beams are defined as multiple directions with the same set of antennas. Hence, only the angle, subbands and beamlets can be modified per beam.
27	20080206	Step 4 and Step 5 for MAC/SAS will be changed. The control of the offline pipeline will be postponed because the offline subsystems are not fixed yet. Currently the definition and design of the metadata flows will be set as goal for Step 4 and the implementation of the metadata flow will be the end goal of Step 5. Hence, after Step 5 (part of) the metadata is included in the Measurement Set.
28	20080213	Currently a single subband and single beam is stored in a Measurement Set. As soon as we are ready for mosaicing this probably should be changed in the future.
29	20080220	For storing the raw station beams the sanitizing operations like input buffer will be included in the online part. For this OLAP has to give operational support or instructions to the observers how to start up manually such observations. Since, this is

		an between solution this will not be automated via SAS/MAC.
30	20080227	Weekly build environment will be updated and automated.
31	20080227	After Step 5 the software documentation will be updated and obsolete packages will be removed.
32	20080423	Basically two Low Band modes will be supported initially: a LBL and LBH mode. The connection between antennas and RCUs have to be chosen such that those to modes make sense.
33	20080528	The position of all individual dipoles will be made available centrally in the database.
34	20080603	The data format of the positions will be delivered in ETRS coordinates by the roll out team. However, the data format of the positions will be stored in ITRF format in the LOFAR databases. Hence, all software and configuration files dealing with coordinates must be made compatible with the ITRF dataformat. Hans van de Marel is responsible to convert the ETRS coordinates to ITRF coordinates for the LOFAR system.

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Table round

- After Step 5, one full week will be used to update the documentation of the Software: Marcel can distribute already the instructions how to update the documentation to all software engineers. Marcel needs one week to update the build environment such that the engineers can see the result of adding comments. Last week of August will be scheduled for this. After that all engineers can check if the software packages are documented correctly.